

Pregnancy In HD

Magdy ElSharkawy

- Pregnancy is not common in HD patients

Pregnancy and Kidney Dialysis

- Over 90 percent of women of childbearing age on dialysis cannot get pregnant.
- Also, many women on dialysis even if they menstruate they have usually an ovulatory cycles.
- Of those who got pregnancies, about 20 percent will end in miscarriage.
- About 80 percent of dialysis pregnancies will only go about 32 weeks, resulting in a premature birth.

Plant L et al. RCOG; 2008:272

Pregnancy with ESRD is not Common

Country	Years Period	Number of Patients on HD	% of conception per year
<u>EDTA</u> (13 European countries)	1970-1980	13,000	<1%
<u>USA</u>	1992-1995	6230 women (age 14-44)	0.5%
<u>Belgium</u>	1989 -1996	4,545	0.3%
<u>Japan</u>	1977-1996	38,889 (age 32.7 ± 5.0)	3.4%

(1) Br J Obstet Gynaecol. 1980;87(10):839-845.

(2) Okundaye I et al. Am J Kidney Dis. 1998;31(5):766-773.

(3) Jacques A et al. Am J Kidney Dis. Vol 31, No 5 (May), 1998

(4) Toma H et al. 1999;14(6): 1511-1516.

- Pregnancy is not common in HD patients
- 1 in 200 women of childbearing age on dialysis become pregnant
- Why?

Plant L et al. RCOG; 2008:272.

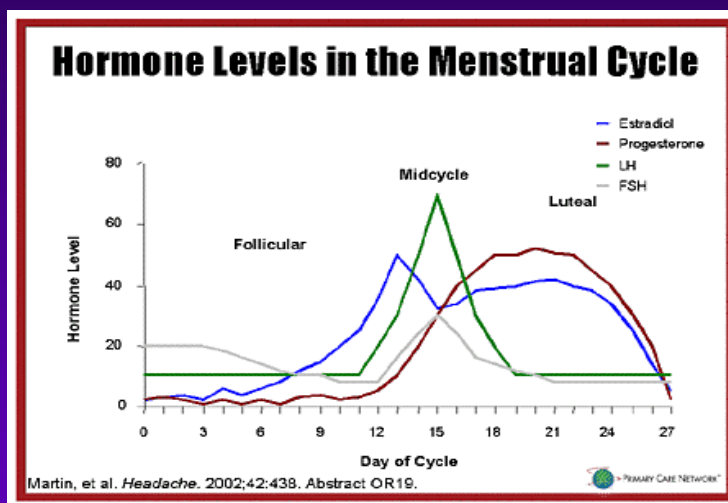
Reproductive and sexual dysfunction in HD

Hyperprolactenemia

75% to 95% of patients

LH surge absent

Abnormalities in
endometrial
morphology



Low levels of
estrogen &
progesterone.

Anovulation,
even with
preserved
menstrual cycles.

Dysregulation of the menstrual cycle,
leading to amenorrhea by the time the
patient reaches ESRD.

Outcome

Table 4. Pre-pregnancy Kidney Function (Scr) With Estimates for Obstetric Complications and Outcome (>24 weeks) and Loss of Kidney Function

Scr $\mu\text{mol/L}$, mg/dL	Fetal Growth Restriction, %	Preterm Delivery	Preeclampsia, %	Perinatal Deaths, %
≤ 125 (≤ 1.4)	25	30	22	1
125–180 (1.4–2.0)	45	70	40	6
≥ 180 (≥ 2.0)	70	>90	60	12

Estimates are based on literature from 1985 to 2009, with all pregnancies attaining at least 24 weeks. Data from Davison (unpublished) and Williams and Davison.⁵⁹

OUTCOME

- ❑ 72% of unsuccessful pregnancies result in spontaneous abortion.
- ❑ The likelihood of pregnancy resulting in a surviving infant approaches 60%-70% if the pregnant mother reaches the second trimester.
- ❑ For women who start dialysis after conception, the likelihood of having a surviving infant is 75%-80%

Fetal Complications

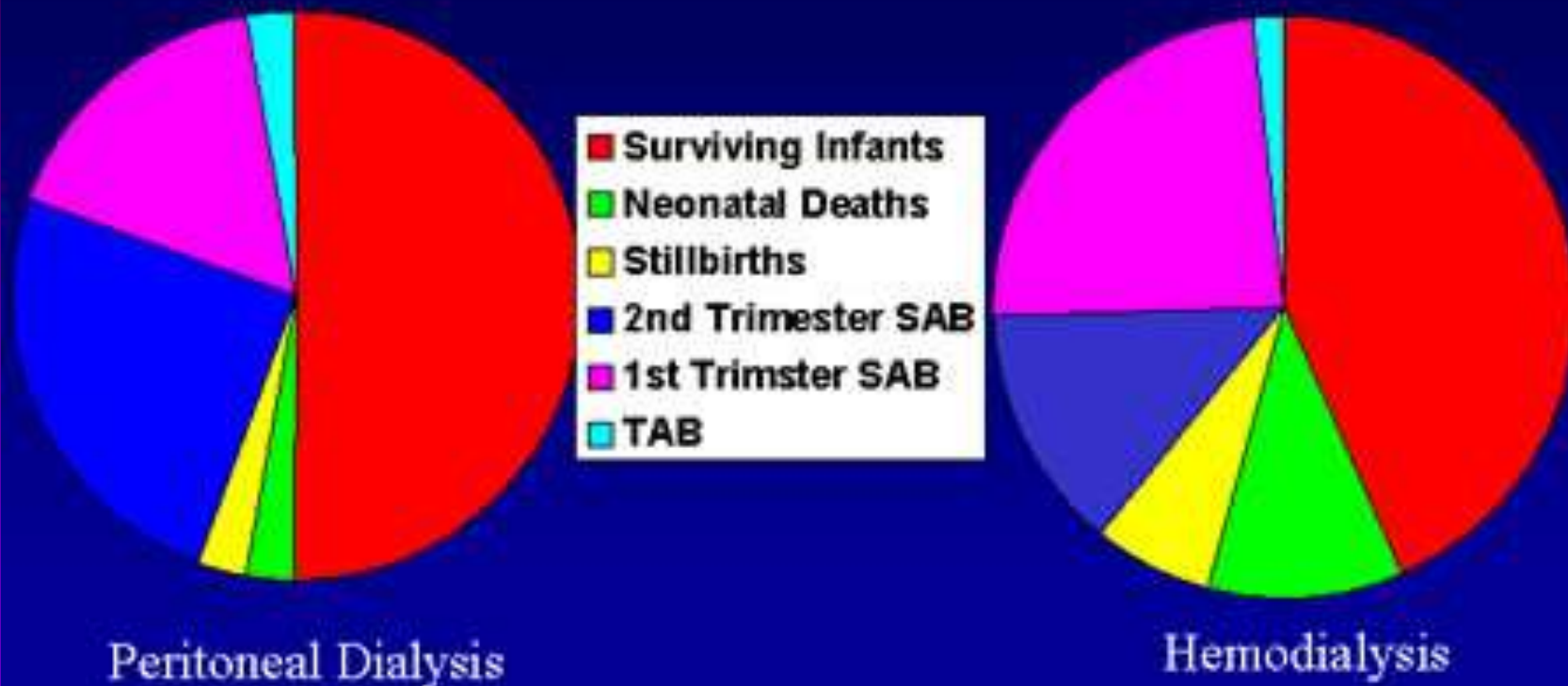
Prematurity and growth Restriction.

*85 % of the infants born prematurely
(mean gestational age, 32.4 weeks).*

36% weighed less than 1,500 g at birth.

28% were small for gestational age.

Outcome vs Dialysis Modality



World Congress of Nephrology, 2003

Frequency of Conception in Women Undergoing Dialysis

Frequency of Conception

• Pregnancies 1992-1995	135 (2.2%)
• Hemodialysis	109 (2.4%)
• Peritoneal Dialysis	18 (1.1%)*

*p<.01

CKD and pregnancy - Historical Aspects

- Historically (before 1975) pregnancy discouraged for women with CKD and early termination advised
- Confortini et al reported the first successful pregnancy in a woman on chronic HD
(*Proc Eur Dial Transplant Assoc* 1971:74-80).

“children of women with renal disease used to be born dangerously or not at all – not at all if their doctors had their way.....nature takes a helping hand by blunting fertility as renal function falls”

Lancet, 1975, 801-2

PREGNANCY IN DIALYSIS PATIENTS

- ❑ Frequency of pregnancies during hemodialysis is low (between 0.3%, and 0.75% per year in women of childbearing age).
- ❑ Report from Saudi Arabia found that 7.3% of married women under the age of 50 years became pregnant during the time they were undergoing long-term dialysis.

CKD and pregnancy

- Due to substantial improvements in HD, antenatal and neonatal care, fetal outcome has improved considerably in the last two decades



Infant survival rate

- Since the 1980s, the infant survival rate has improved from 20–30% up to 50% in 2003
- This is due to the care provided by a multidisciplinary management team, characterized by close collaboration between patients, nephrologists, dialysis staff, obstetricians and neonatologists.



Pregnancy in Dialysis Patients: Is the Evidence Strong Enough to Lead Us to Change Our Counseling Policy?

n=90 pregnancies from 2000 to 2008

Clin J Am Soc Nephrol (2010) 5: 62–71

Pregnancy in dialysis patients in the new millennium: a systematic review and meta-regression analysis correlating dialysis schedules and pregnancy outcomes

n=616 pregnancies from 2000 to 2014

Nephrol Dial Transplant (2015) 0: 1–20

Main features of the studies

Reference	Period of Study	Country	Type of Study	Objective as Stated in the Study	No. of Cases	Maternal Age
Chou <i>et al.</i> (9), 2008	1990 to 2006	Taiwan	Ret	To investigate the pregnancy outcome in patients on chronic dialysis over the past 15 yr in a single center and also perform a combined analysis of results ... from reported series to obtain overall estimates of rates of successful delivery	13 P ^a	HD group: 35.0 ± 4.3
Bamberg <i>et al.</i> (15), 2007	2000 to 2004	Germany	Ret	To evaluate the effect of intensified fetal surveillance <i>via</i> Doppler ultrasound and fetal nonstress test on the perinatal outcome of pregnant women on an intensified hemofiltration scheme	5 P ^b	28 (21 to 37)
Barua <i>et al.</i> (5), 2008	2001 to 2006	Canada	DCS M	To describe maternal and fetal outcomes as well as changes in clinical and biochemical indices before and after conception	7 P, 5 W ^c	33 ± 4
Tan <i>et al.</i> (16), 2006	1995 to 2004	Singapore	Ret	To report obstetric outcomes in women undergoing chronic renal dialysis	11 P ^a , 7 W ^a	28 (25 to 39)
Malik <i>et al.</i> (8), 2005	1992 to 2003	Saudi Arabia	Pro	To report the frequency and outcome of pregnancies of women on dialysis in a referral center in Saudi Arabia	12 P ^a , 9 W ^a	29 (20 to 37)
Haase <i>et al.</i> (17), 2005	2000 to 2004	Germany	Pro	To report the successful multidisciplinary management of five consecutive pregnant dialysis patients	5 P ^f	28.0 ± 6.6
Eroğlu <i>et al.</i> (7), 2004	2000 to 2002	Turkey	Ret	To review the treatment and outcome of seven pregnancies in women undergoing chronic hemodialysis	7 P ^g	25 (22 to 31)
Moranne <i>et al.</i> (18,29), 2004	1995 to 2001	France	NR	Not specified (letter)	7 P ^h	NR
Luciani <i>et al.</i> (19), 2002	1988 to 1998	Italy	Ret	To review the patients on hemodialysis to identify the factors that may affect the course of the pregnancy and the fetal outcome	5 P ⁱ	27.00 ± 3.46
Chao <i>et al.</i> (12), 2002	1990 to 2000	Taiwan	Ret	To describe the treatment of pregnancy and the outcome in a series of patients undergoing long-term hemodialysis	18 P, 15 W	29 (22 to 43)

Pregnancy and CKD

- A 2008 publications report pregnancy in 1–7% in women on chronic dialysis
- Pregnancy in contemporary women on dialysis is more likely to be successful, with 30–50% of pregnancies resulting in delivery of a surviving infant



Journal of Medical Case Reports 2008, 2:10,

Diagnosis of pregnancy in HD patients

- It can become difficult to detect pregnancy and some women only suspect they are pregnant when they develop other unexplained symptoms, such as nausea and fatigue.
- Standard pregnancy tests, including home testing kits, are still reliable in kidney disease, unless urine output is very low, in which case a blood test can be performed.

Contraception in HD patients

- Contraception is advised while you plan your pregnancy.
- There are no problems in using barrier methods of contraception such as condoms.
- Progesterone-type methods such as the 'miniPill', injection (Depo-Provera®), implant (Implanon®) and
- Loops, are often the best choice of contraception as they do not have an effect on blood pressure.

Maternal complications

- *Preeclampsia.*
- Malignant hypertension.
- % Abruptio placentae.
- % Spontaneous abortion.
- % Hemorrhage.
- % Disseminated intravascular coagulation.
- % Clotting of the vascular access

Preeclampsia and severe hypertension

- They are the greatest risk factors for prematurity and other adverse outcomes.
- Eighty percent of pregnancies occurred in dialysis women are complicated by hypertension which was responsible for 1% of mortality of mothers in the past.
- To date, mother mortality is absent.
- Uncontrolled hypertension must be adequately treated, maintaining diastolic blood pressure <80–90 mmHg

Maternal Complications.

- % Approximately 80% have blood pressure greater than 140/90 mm Hg .
- % In more than half the patients blood pressure exceeds 170/110 mm Hg.

Treatment of HTN

When to treat :

Diastolic > 90 in second trimester

Diastolic >100 in third trimester

Management of Hypertension

A.C.E.I: ***Absolutely contra- indicated.***

% Adverse effect:

Oligohydramnios, pulmonary hypoplasia, respiratory failure.

1) Patent ductus

2) Congenital anomalies.

Management of Hypertension

- % ***Alpha- Methyldopa***: is the drug of choice.
- % *Calcium channel blockers*: Nifedipine, nicardipine, and verapamil
- % C.C.Bs may potentiate the hypotensive effects and neuromuscular blockade of magnesium .

Management of Hypertension

Diuretics: There is a strong aversion to using diuretics . %

Diuretics: aggravate the decreased intravascular volume seen with preeclampsia, possibly contributing to organ hypoperfusion.

Management of Hypertension

% *Diuretics:* reports of neonatal thrombocytopenia, hemolytic anemia, jaundice, and electrolyte abnormalities with thiazides.

Management of Hypertension

◆*Beta-Blockers:*

- Neonatal bradycardia.
- Hypoglycemia.
- Respiratory depression .
- Intrauterine growth restriction.

Management of Hypertension

- ***Prazocin:*** No adverse effects on the fetus have been reported.
- **Labetalol:** is not associated with fetal bradycardia and growth restriction, and the drug is widely used in preference to beta-blockers.
- It is another first-line drug.

Management of Hypertension

%

Hydralazine: It is ineffective as a single oral agent but can be added to a first-line drug .

Clonidine: is a centrally acting α_2 - agonist that has been reported in one study to have efficacy and safety similar to α methyl-dopa.

Drugs for Hypertensive Emergencies

% Intravenous hydralazine :in doses of 5 to 10 mg every 20 to 30 minutes is the drug of choice.

% Intravenous labetalol: 20-mg loading dose followed by 20 to 30 mg every 30 minutes or a 1 to 2 mg/min drip.

% Reports of fetal bradycardia or hypotension .

Prophylaxis

1. • Prophylaxis for risk group: low dose aspirin
2. Hospitalization and rest.
3. • Take a decision to terminate or to continue pregnancy.

% **Indications of termination of pregnancy**

- • Signs of impending eclampsia (hyperreflexia, headache and blurring of vision).
- • Evidence of liver affection (abd. Pain, elevated liver enzymes, jaundice).
- • Evidence of DIC or HELLP. Evidence of fetal stress.
-

INFECTIONS

- Urinary tract infections, and these women should have monthly screening urine cultures. %
- If asymptomatic bacteriuria is present, the patient should be treated for 2 weeks.
- May be treated with suppressive doses of antibiotics for the rest of the pregnancy .

Management of dialysis during pregnancy

- % There is no indication to change the modality of dialysis.
- % A study showed that NHD which augment uremic clearance, allowing a normal preg.
- % NHD stabilizes metabolic and electrolyte abnormalities.
- % Allows for improved modulation of volume and blood pressure.

Intensive Hemodialysis

- Minimizes profound fluid shift in maternal intravascular volume.
- Maintaining lower U.F targets per treatment with lower blood flows.
- May decrease the incidence of maternal hypotension and compromised fetal blood flow.

Intensive Hemodialysis

- Stabilizing maternal hemodynamic, may improve maternal and fetal outcomes.
- Decreasing the incidence of hypertension, preterm labor, polyhydramnios and allowing longer gestational periods.

Intensive Hemodialysis

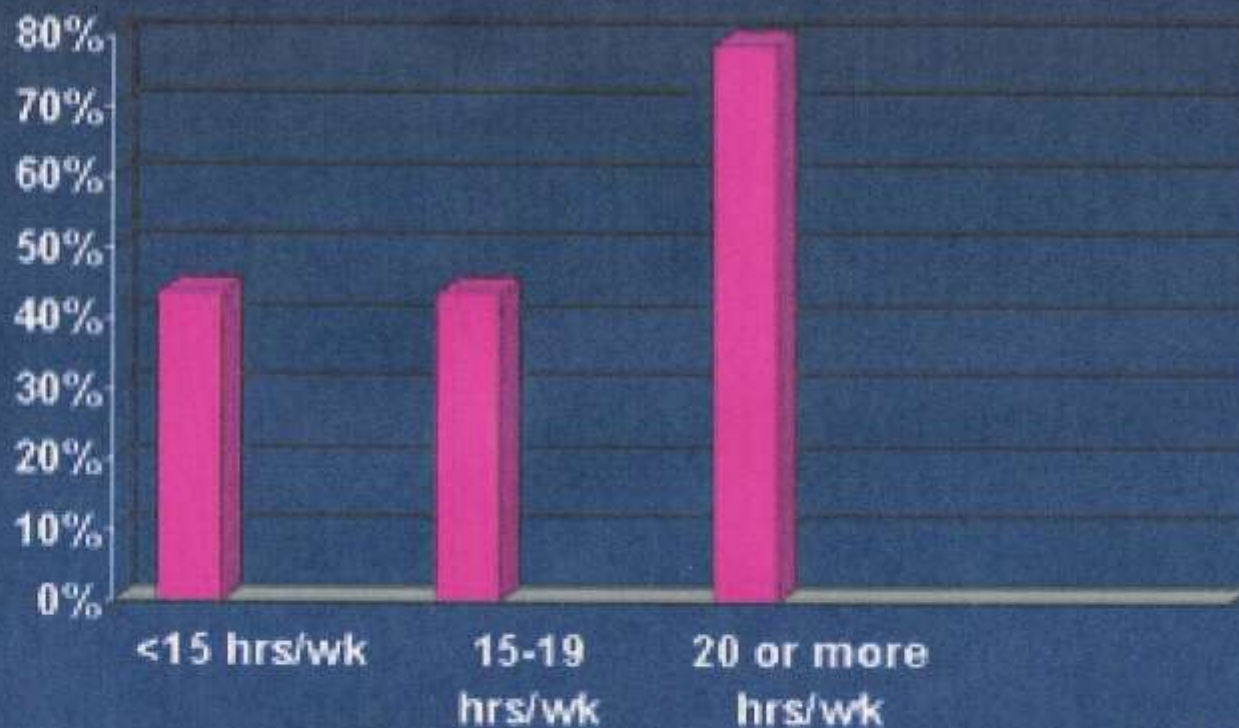
- % A target Kt/V of 1.5 has been suggested.
- % High-flux dialyzers?.
- % The predialysis maternal serum blood urea nitrogen and creatinine levels were maintained in the range of 50 to 70 mg/dL and <9.0 mg/dL.

Intensive Hemodialysis

A high blood urea nitrogen level in the fetus with normal kidneys may cause an osmotic diuresis that aggravates polyhydramnios.

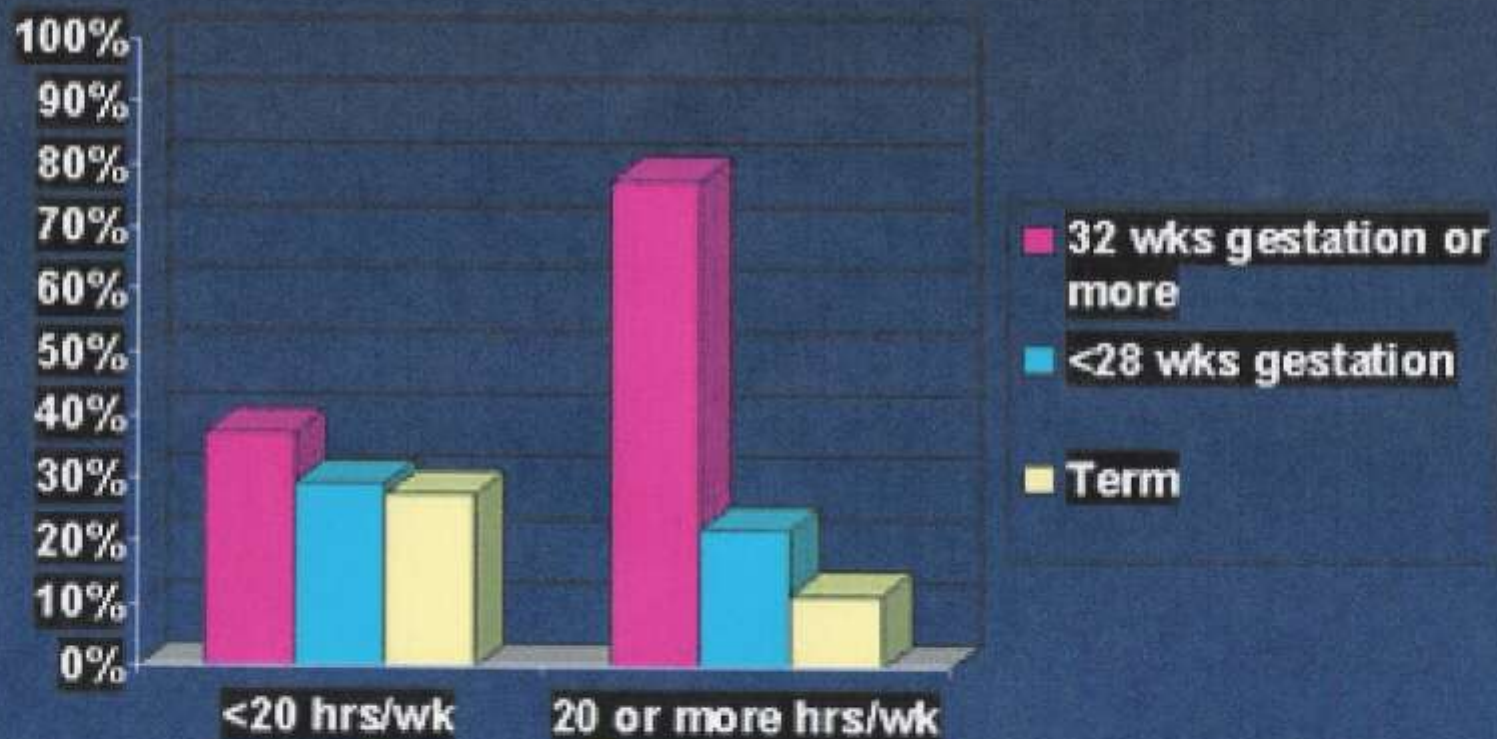
% Dialysis better to be increased to at least **20 hours per week to achieve an improvement in outcome.**

Infant Survival vs Intensity of Dialysis



$P < .05$

Prematurity vs Hours/WK of Dialysis



Intensive Dialysis

- Potential Problems
 - Alkalosis
 - Hypercalcemia
 - Hypokalemia
 - Hypophosphatemia
 - Loss of Water Soluble Vitamins
 - Progesterone loss-precipitation of labor?

Bicarbonate

- Liable to develop respiratory alkalosis because of hyperventilation as well as metabolic alkalosis because of dialysate bath containing bicarbonate 35 - 40 mEq/L .

- **In this case**

Shift to bath containing 25 mEq/L bicarb.

Calcium

% Care of Ca^{++} level:

Pregnant women on dialysis has tendency to hypercalcemia because of:

1. Use of dialysis bath containing $\text{Ca}^{++} > 3.5 \text{ mEq/L}$.
2. Calcitriol produced by the placenta.
3. Use of big amounts of Ca^{++} containing - phosphate binders.

So we have to use

1. Dialysate containing $\text{Ca}^{++} 2.5 \text{ mEq/L}$.
- 2.

Pregnancy and Serum Calcium

- Since the placenta converts some 25-hydroxyvitamin D3 to 1, 25-dihydroxyvitamin D3, adjustment of vitamin D may be required during pregnancy and should be guided by measurement of levels of vitamin D, parathyroid hormone, calcium and phosphorus

Phosphorus

- % During a 4-hour dialysis, the loss of phosphorus across the dialyzer membrane can be as high as 2.5 to 3.0 g.**
- % To prevent net phosphorus loss, measure phosphorus flux and added phosphorus to the dialysate at a concentration of 3.66 mg/dL.**

Anticoagulation

- Heparin-free dialysis be limited to women with bleeding problems.
- Heparin does not cross the placenta and is not teratogenic.
- Coumadin crosses the placenta, is teratogenic in the first trimester, and may cause bleeding in the fetus in the third trimester.

Nutrition and CKD-Pregnancy

- 1 g/kg/day protein intake plus an additional 20 g/day for fetal development have been suggested
- Folate supplementation is required, particularly early in fetal development
- Replacement of water-soluble vitamins should be continued during pregnancy

Nutrient	Recommendations
Calories	35 kcal/kg pregravid IBW 35 kcal/kg pregravid IBW +300 kilocalories (2nd and 3rd trimester)
Protein	1.2 g/kg pregravid IBW + 10 gm (HD) 1.4g/kg pregravid IBW + 10gm (PD) may be higher due to stress
Sodium	2-4 gm, individualized
Potassium	2-4 gm, individualized
Phosphorus	1,200 mg, individualized
Calcium	1,200 mg, individualized, also monitor Dialysate calcium concentration
Fluids	1000-2000cc + urine output, keep fluid Gains to 1-2 kg



Vitamins

A	No supplement
E	No supplement
C	>170 mg/d
Thiamine	3 mg/d
Riboflavin	3.4 mg/d
Niacin	> 20 mg/d
B6	> 5 mg/d
Folic acid	1.8 mg/d



Minerals

Calcium	2,000 mg/d (phosphate binders)
Phosphorus	1,200 mg/d
Magnesium	200-300 mg/d
Zinc	15 mg/d
Carnitine	330 mg/d

Anemia and CKD-Pregnancy

- Anemia occurs during pregnancy and pregnant dialysis patients require intensive anemia management.
- Erythropoietin has been given safely to pregnant dialysis patients
- Erythropoietin doses need to be increased by approximately 50% in order to maintain target hemoglobin levels of 10–11 g/dl
- Higher erythropoietin doses is required due to
 - ◆ increased vascular volume with subsequent hemodilution and
 - ◆ possibly erythropoietin resistance (due to enhanced cytokine production) during pregnancy may contribute

ANEMIA

◆ Erythropoietin:

- 50% to 100% increase in the dose can be prescribed, Epo resistance due to inflammatory cytokines and hemodilution.

Epo increase the probability of preg due to its effect on the reproductive system.

◆ Iron therapy:

- *Serum iron and ferritin levels usually decrease during pregnancy in dialysis patients.*



Target hematocrit/hemoglobin for erythropoietin therapy

Hemoglobin	→	11–12 g/12 g l
Hematocrit	→	33–36%36%

Target iron level

The patients should have sufficient iron to achieve and maintain an Hb (Hct) of 11-12 g/dl (33-36%)

		OPTIMAL
Serum ferritin	>100 ng/ml	200--500ng/ml
Transferrin saturation	>20%	30-40%
Hypochromic red cells	<10%	<2.5% (<5%)
ReticulocyteHbcontent	>29pg/cell	~35pg/cell

2005

The changes of hemodialysis before and after pregnancy

	<i>Duration (h)</i>	<i>Blood flow rate (mL/min)</i>	<i>Dialysate flow rate (mL/min)</i>	<i>Frequency (No./wk)</i>
Before Preg	4	200-250	500	3
After preg	4	250-300	500-600	4-6

Reddy & Holley, 2007. Advances in Chronic Kidney Disease, 14(2), 146-155.

Treatment factor	Recommendation
Dialyzer	Non-reuse, biocompatible; consider smaller surface area dialyzer to reduce ultrafiltration rate during treatments
Frequency of treatment	Four to six times per week after the first trimester
Predialysis BUN	<45–50 mg/dl
Dialysate	Bicarbonate, 25 mEq/L; potassium, 3–4 mEq/L—adjusted based on serum chemistries
Anemia	10–11 g/dl—will usually require 50% increase in erythropoietin dose May choose to give erythropoietin with each dialysis treatment
Iron sat	>30%—maintenance intravenous iron will likely be required
Folate	1 mg/day, especially during early pregnancy
Nutrition	Protein intake of 1.8 g/kg/day; expect 1 lb. weight gain/week or 500 g every 10 days; water-soluble vitamin supplements
Hemodynamics/blood pressure	Maintain maternal diastolic blood pressure at 80–90 mmHg Avoid maternal volume depletion and hypotension on dialysis Avoid ACE inhibitors and angiotensin receptor blockers Avoid diuretics in nonanuric women
Obstetric/fetal monitoring	close follow-up

OBSTETRIC MANAGEMENT

% *Premature Labor.*

% *Delivery.*

Premature Labor

Magnesium can be used but, extreme caution must be used to avoid magnesium toxicity and respiratory depression .

A loading dose can be supplemented after each dialysis treatment or when the magnesium level has been documented to decrease to less than 5 mg/dL.

% Continuous infusion should be avoided.

Labor and Delivery

- % Electively deliver infants as early as 34 to 36 weeks in dialysis patients if fetal lung maturity occur.
- % Caesarian delivery should be performed only for the usual obstetric indications.

MANAGEMENT ISSUES IN THE *NEWBORN*

- Infants of dialysis patients are born with blood urea nitrogen and creatinine levels equal to the mother's.
- They generally experience an osmotic diuresis after birth.
- Without careful monitoring and replacement, they develop volume contraction and electrolyte abnormalities.

% A team of renal, obstetric, and pediatric physicians, nurses, and nutritionists is required to ensure the safety of the mother and to maximize the chances of survival for the infant .

Piccoli et al., Nephrol. Dial. Transplant. (2014)

Thank you

Nutritional management of pregnant with CKD

- The nutritional management of pregnant adults with chronic kidney disease (CKD) presents the challenge of combining necessary modifications in nutrient requirements for both pregnancy and kidney impairment.
- The dietitian must follow these women closely to ensure adequate intakes of kilocalories, protein, and specific vitamins and minerals.

Nutritional management of pregnant with CKD

- Combining the suggested energy and protein needs for CKD recommended by the Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines with those for the general population seems feasible during pregnancy.
- Vitamin and mineral requirements are also a combination of those for CKD and pregnancy. Although diets may need to be restricted because of CKD, goals are to have good communication among members of the health-care team to allow the patient optimal nutrition combined with quality medical care.

Nutrition and CKD-Pregnancy

- 1 g/kg/day protein intake plus an additional 20 g/day for fetal development have been suggested
- Folate supplementation is required, particularly early in fetal development
- Replacement of water-soluble vitamins should be continued during pregnancy

Pregnancy and Serum Calcium

- Dialysate adjustment may be needed to maintain appropriate levels of serum calcium and to avoid hypocalcemia and/or post-treatment hypercalcemia.
- Since the placenta converts some 25-hydroxyvitamin D3 to 1, 25-dihydroxyvitamin D3, adjustment of vitamin D may be required during pregnancy and should be guided by measurement of levels of vitamin D, parathyroid hormone, calcium and phosphorus

Anemia and CKD-Pregnancy

- Anemia occurs during pregnancy and pregnant dialysis patients require intensive anemia management.
- Erythropoietin has been given safely to pregnant dialysis patients
- Erythropoietin doses need to be increased by approximately 50% in order to maintain target hemoglobin levels of 10–11 g/dl
- Higher erythropoietin doses is required due to
 - ◆ increased vascular volume with subsequent hemodilution and
 - ◆ possibly erythropoietin resistance (due to enhanced cytokine production) during pregnancy may contribute

Intravenous iron and heparin

- Both intravenous iron and heparin appear to be safe during pregnancy
- However frequent monitoring of iron stores is required and minimizing heparin dose is recommended

Improving Infant Survival

- Multiple causes of premature delivery exist, including polyhydramnios, maternal hypertension and premature rupture of the membranes
- Since increasing dialysis frequency lowers predialysis BUN levels, adequate dialysis may reduce the occurrence of polyhydramnios and thus lower the risk of premature labor
- Increasing the dialysis dose prolongs gestation, resulting in a higher infant birth weight and thus an infant with better chance of survival



Dialysis and fetal outcome

- In the largest study to date, the Registry for Pregnancy in Dialysis Patients reported a significant correlation between hours spent on dialysis therapy and improved fetal outcome.
- The increase in dialysis time seems to improve the pregnancy outcome and offer several advantages:
 - ◆ It ensures less uremic environment to the fetus and allows the mother more liberal diet (Potassium and protein),
 - ◆ it may help to control hypertension and fluid intake and may also reduce the amplitude of blood volume and electrolyte shifts

Okundaye I, Abrinko P, Hou S: Registry of pregnancy in dialysis patients. *Am J Kidney Dis* 1998;766-773.

Effect of low GFR and Proteinuria on Pregnancy

- The association of low GFR and proteinuria with protein greater than 1 g/d has a greater effect on pregnancy-related GFR decrease than either factor alone.
- Effect of this association is greater than other commonly considered factors impacting on the decrease in renal function, such as arterial hypertension or underlying renal disease.
- Proteinuria is a well-recognized predictor of rate of progression of diabetic and nondiabetic CKD.
- Therefore, women with a lower GFR and greater proteinuria may be more susceptible to the potentially harmful effects of hemodynamic adaptation to pregnancy, which, in turn, may impact on both maternal and fetal outcomes.

Fetal outcomes in CKD Pregnancy

- Women with renal function impairment were shown to be at risk of adverse fetal outcomes.
- A high rate of fetal loss was reported in the past for women in this condition.
- Advances in perinatal care achieved in the last decades made possible an improvement in rate of live births that accounted for 93% of the series published in 1996.
- Recent data shows that perinatal mortality limited to 4% of patients. This rate represents an additional improvement.
- However, it remains nearly 3-fold greater than that in the general population

Am J Kidney Dis 2007;49:753-762.

Fetal Complications in CKD Pregnancy

- Number of preterm deliveries are very high, and most newborns are low birth weight or SGA.
- Prematurity occurs in most cases and growth retardation, increase in hypertension, or decrease in renal function noted
- An anticipated delivery may be reasonable because most low-birth-weight infants have a good prognosis provided that delivery occurs in a setting with adequate perinatal care.
- However, complications in premature infants have not been completely eliminated by advances in neonatology, especially for very-lowbirth-weight babies (1,500 g).
- These infants are at greater risk of neonatal mortality and such late consequences as low intelligence quotient and neurosensory impairment.
- These risks should be considered when the time of delivery is planned and should be included in the information offered to women with CKD who contemplate a pregnancy.

Summary...

- Women with moderately decreased GFR (60 to 40 mL/min/1.73 m² [1.0 to 0.067 mL/s/1.73 m²]) may have a successful pregnancy without substantial risk of accelerated progression of their renal disease.
- A more severe renal function impairment combined with urinary protein excretion exceeding 1 g/d predicts a deleterious effect on the course of renal disease after pregnancy.
- Fetal outcome also is strongly related to the combined presence of these factors.

...Summary

- Women of childbearing age with CKD should have an early referral to a nephrologist to assess the risks of a possible pregnancy.
- In the event they become pregnant, they should have adequate monitoring of obstetric and renal parameters.
- To minimize risks associated with pregnancy, they should be referred to centers in which strict cooperation between nephrologist and obstetrician is feasible and an intensive care neonatal unit is available.

Conclusion

- All aspects of dialysis, including duration, adequacy, nutrition, anemia, calcium and phosphate metabolism and BP control needs to be closely followed throughout the course of pregnancy.
- Furthermore, a successful pregnancy in woman on dialysis requires collaboration among nephrologists, dialysis unit staff and obstetricians.
- Finally, since pregnancy can occur in woman on dialysis, health care providers should discuss fertility and contraception with their premenopausal dialysis patients.

Recommendations

- 5. Treatment of hypertension must be done under strict supervision .
- 6. Correct anemia based on NKF-K/DOQI, reinforcing therapy with erythropoietin (compatible with proper blood pressure control) to keep hemoglobin above 10 g/dL and trans-ferrin saturation above 30%.
- 7. Prevent metabolic acidosis.

Recommendations

- 8. Manage mineral metabolism; avoid hypo- and hypercalcemia.
- 9. Prevent hypomagnesemia with adequate dialysis baths and eventually with oral supplements.
- 10. Treat premature start of labor with beta-agonists and magnesium sulfate.
- 11. Reinforce fetal monitoring, especially during hemodialysis sessions.

Management of Pregnant Dialysis Patient

- Intensification of dialysis

Keep B.U.N. ↓ 50 mg/dl to avoid polyhydramnios.



- Adequate supply of calories and protein

Protein intake should be

- 1 g/kg per day
- Additional 20 g/day for fetal growth.
- Supplemented with water soluble vitamins and zinc

- Antihypertensive regimen

Acceptable antihypertensives include labetalol, Nifedipine XL, methyldopa, and metoprolol.

Avoidable antihypertensives Diuretics, ACE inhibitors, ARBs.

- Correction of Anemia

Give Erythropoietin with Iron & Folic Acid supplemented. Keep Hb % > 10.

- Treatment of premature labor

The use of β agonists is preferred & NSAIDs should be avoided.

- Avoidance of metabolic acidosis

- Prevention of hypocalcemia

- Reinforced fetal monitoring as soon as viability is reached

Thanks

